Portfolio Project Option #1: Reducing Bullying in Schools

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With the rise of social media and the internet, children's ability to observe and model inappropriate behavior has given birth to an epidemic of bullying and peer pressure. Global attention and much research has been turned towards discovering and eradicating the causes, as well as supporting all those victimized. Within the United States, 87% of those who committed school shootings indicated that they had been the victims of bullying (Paolini, n.d., p. 3). Additionally, bullying at school has a large negative impact on students' mental health and home life (Lemstra et. al, 2012, p. 11).

The importance of reducing bullying is tantamount to producing a healthy and safe learning environment for students. With this in mind, a small U.S. school with limited resources will examine data from the National Center for Education Statistics, containing results from a survey about crime and safety (NCES, 2018).

They believe it is better to eliminate school bullying at the root, by providing services to students that will address potential causes of violence. They could begin a formal group program which addresses peer interaction and promotes peace and proper social skills, or they could provide a group program for parents, training them how to recognize and handle signs of student violence and bullying. The more expensive option is to hire a full-time mental health professional, or MPH, who can provide one-on-one counselling.

The business questions they wish to answer are as follows: *Does the presence of a MHP significantly affect the amount of bullying in a school? Does the presence of a peer counseling group program significantly affect the amount of bullying? Does parent training have a significant impact on bullying? Which (if any) has the most impact on the amount of bullying in*

our school? And lastly, *Does the person reporting affect the amount of bullying noticed at a school?*

The Data (Descriptive)

The dataset used for the project was filtered to include only relevant variables for the business questions at hand. Variable SCHID represents the unique school identifier from which the survey was taken. Variable C0662 represents whether or not schools employ MHPs with *1* representing *yes* and *2* representing *no*. Variable C0183 represents whether or not schools hold group anger management training, again with *1* for *yes* and *2* for *no*. Variable C0192 represents whether or not a school holds group training, *1* for yes and *2* for *2no.*

Finally, Variable C0376 represents the school's self-assessed score on whether or not bullying is present, with 1 being "happens daily", and 5 being "never happens" (NCES, 2018). It will be referred to as the *bullying score*. The bullying score was collected by various school administrators in different employment positions.

There are no rows missing any variables, so there was no need to remove any rows.

Figure 1

Showing the data generally filtered in SAS by variable.

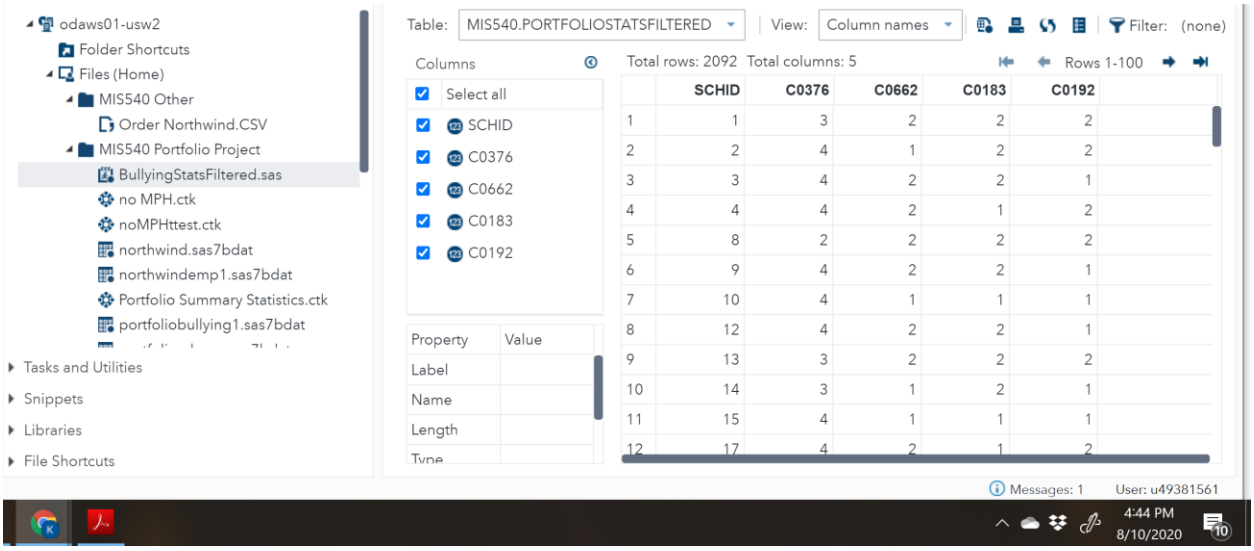
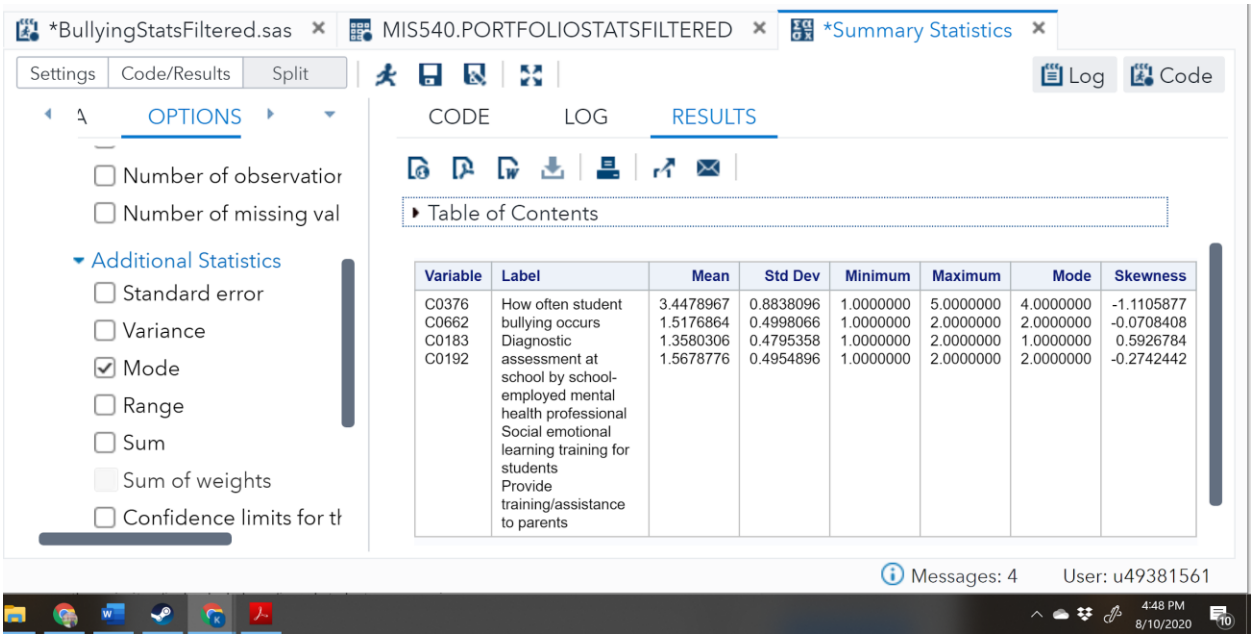


Figure 2

Showing summary statistics for filtered data.



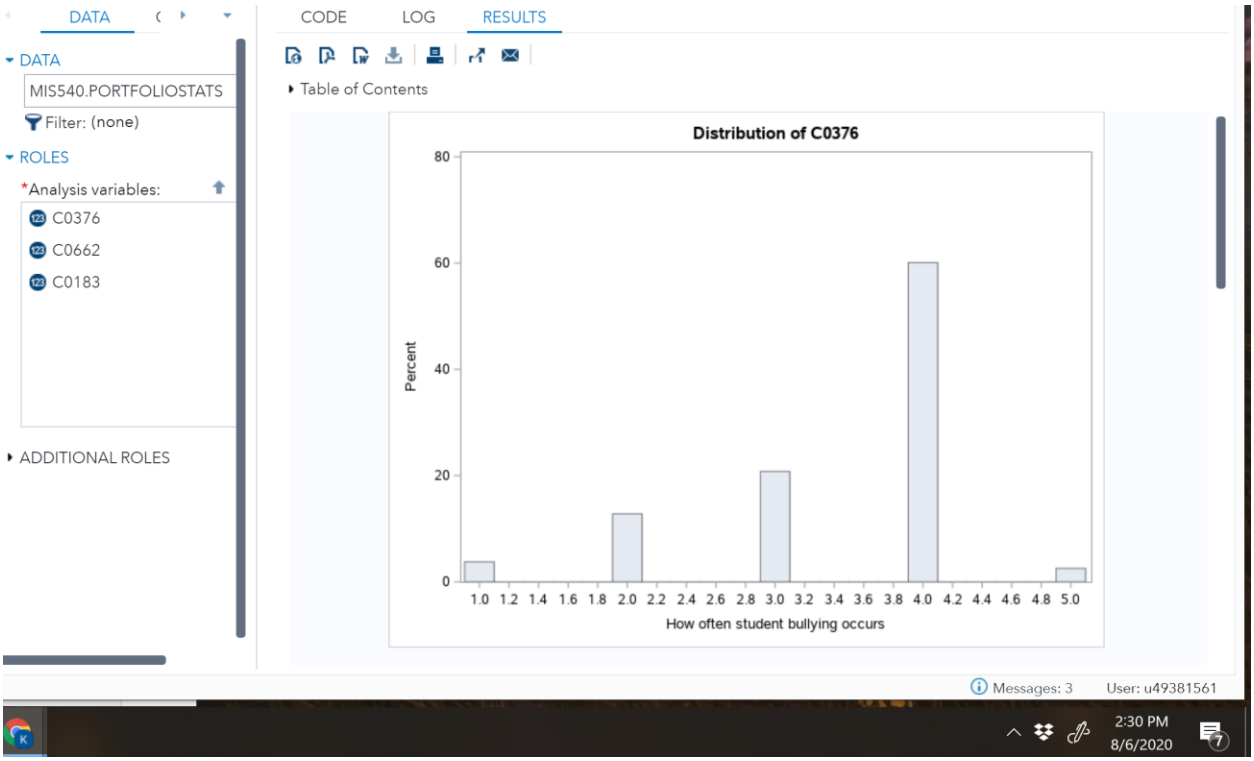
Variable	Label	Mean	Std Dev	Minimum	Maximum	Mode	Skewness
C0376	How often student bullying occurs	3.4478967	0.8838096	1.0000000	5.0000000	4.0000000	-1.1105877
C0662	Diagnostic assessment at school by school-employed mental health professional	1.5176864	0.4998066	1.0000000	2.0000000	2.0000000	-0.0708408
C0183	Social emotional learning training for students	1.3580306	0.4795358	1.0000000	2.0000000	1.0000000	0.5926784
C0192	Provide training/assistance to parents	1.5678776	0.4954896	1.0000000	2.0000000	2.0000000	-0.2742442

A summary of the variables shows us that on average, the score given for school bullying, C0376, is approximately 3.4478, showing that that school bullying is less likely to happen daily, on average. Meanwhile, the mode of the bullying score is 4, meaning the majority of schools surveyed notice bullying happening only occasionally.

The mode for C0662, representing the employment of a MHP, is 2, meaning that the majority of schools do not employ a MHP. The same is true for variable C0192, indicating that the majority of schools do not provide group training for parents. Meanwhile, the mode for C0183 is 1, indicating a *yes*, the majority of schools do have formal student group sessions.

Figure 3

A table showing the distribution of variable C0376.



A look at the distribution of the responses recorded in C0376 shows that there is a negative skew in the distribution. This indicates that more schools reported scores of 4, or that bullying happens "on occasion" (NCES, 2018).

Business Question: Do Formal Student Groups Significantly Impact Bullying?

The school wants first to discover if the use of a formal student group has a significant effect on the amount of bullying. Therefore, before performing any t-testing, the data was filtered to include only data where a MHP is not employed at the school. This way, the bullying score is only affected by the existence of student groups.

Figure 4

Filtering the data to only include schools where a MHP is not employed and where there is no parent training. (2 represents an answer of No.)

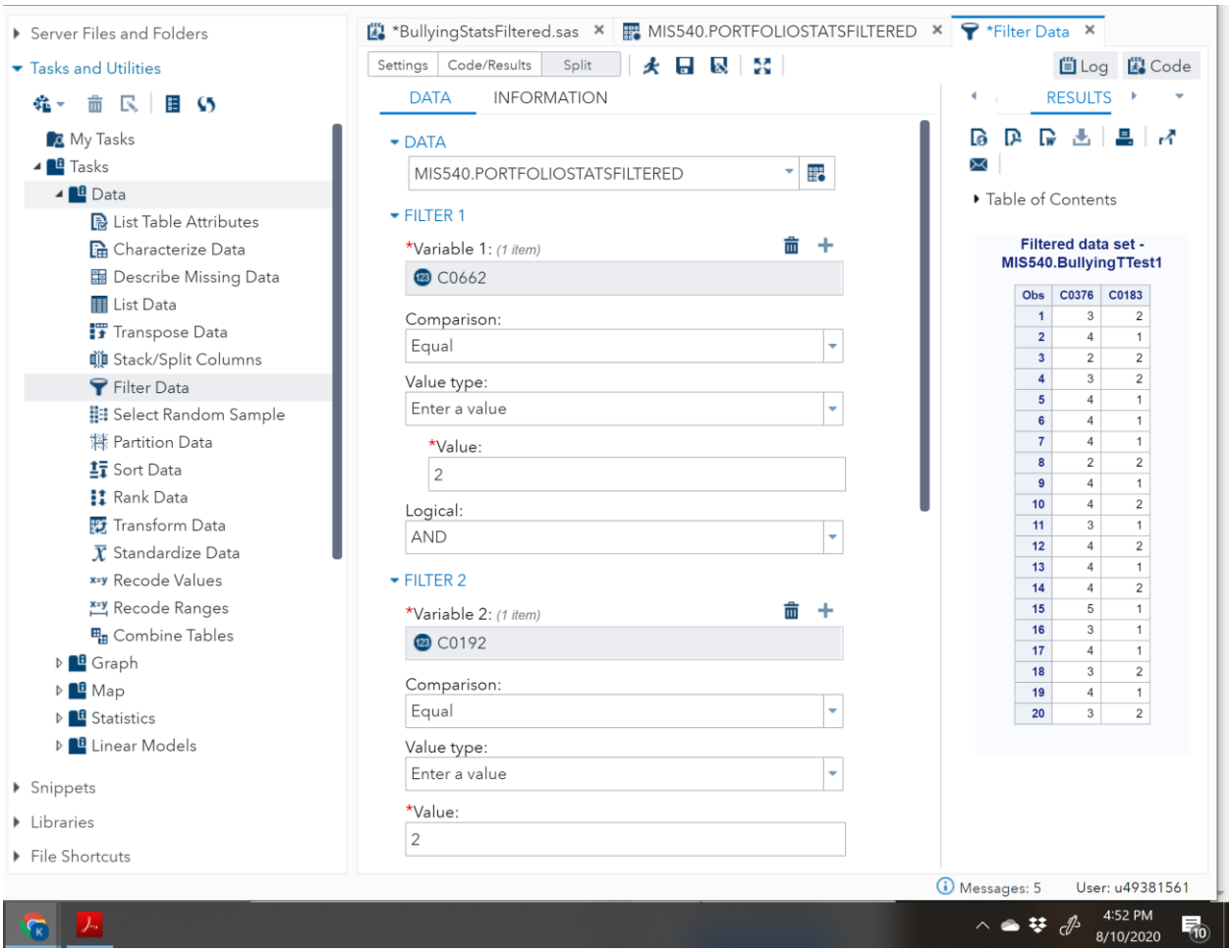
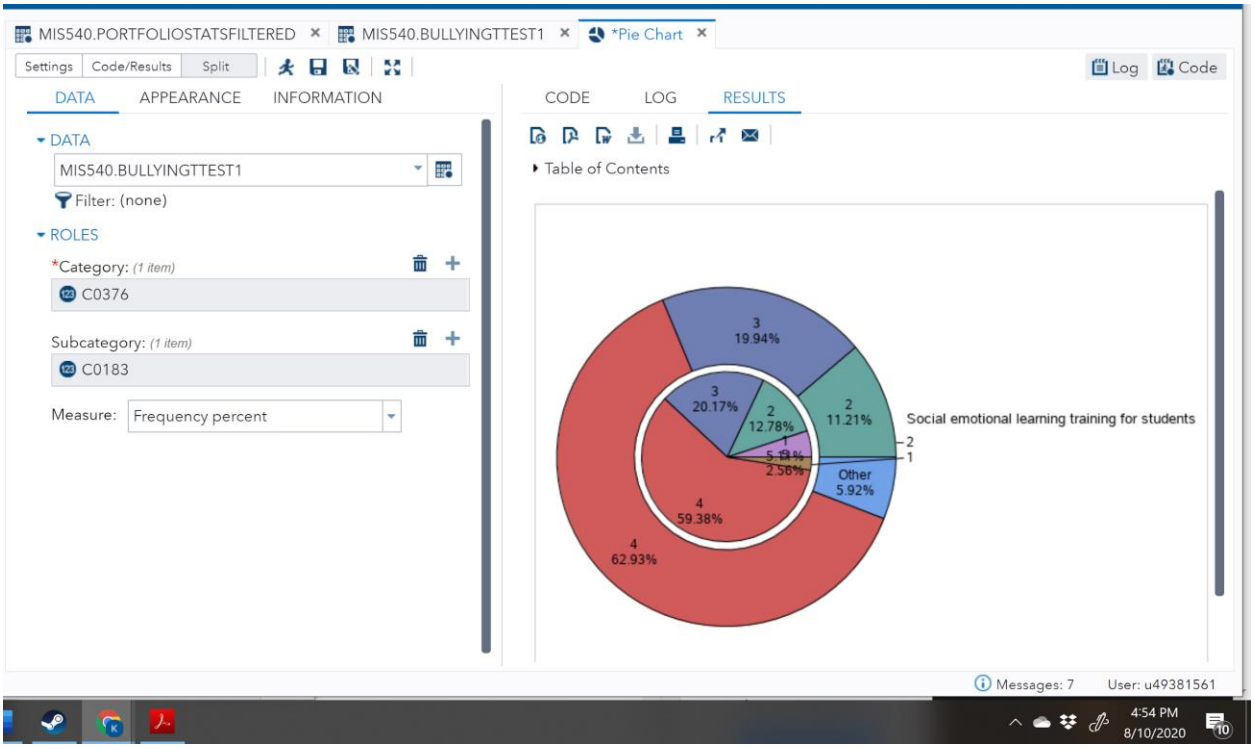


Figure 5

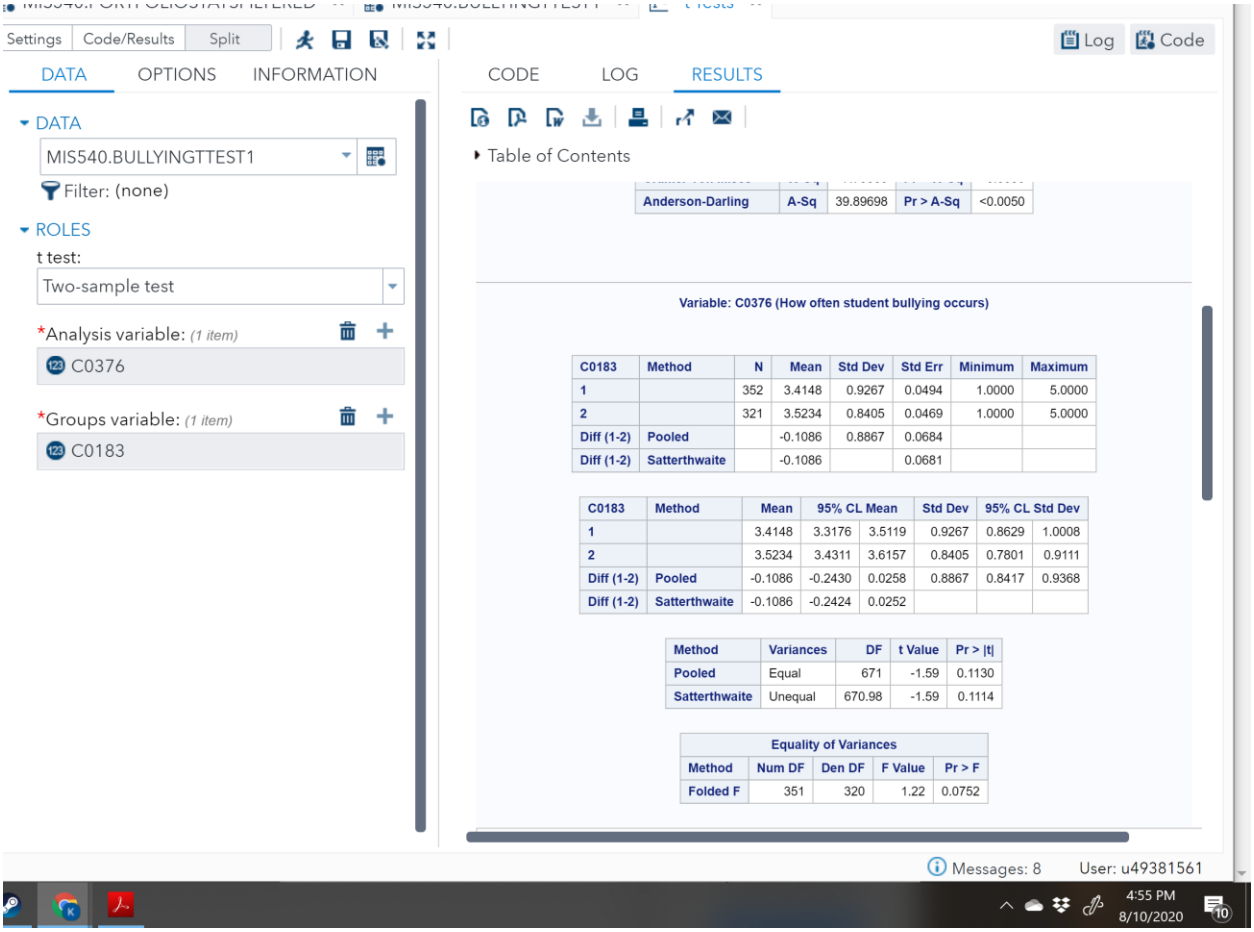
A pie chart showing percentages of student bullying scores, with the inner ring representing Yes, *there are student groups, and the outer ring representing No, there are not.*



Just a quick look at these numbers suggests that there is not a huge amount of difference between the bullying scores of schools with a student group, and schools without student groups. Therefore, a null hypothesis can be created: *Schools with student groups to address social issues do not have a significant impact on bullying.* The alternative hypothesis would be, *Schools with student groups to address social issues do in fact have a significant impact on bullying.*

Figure 6

A t-test using the filtered scores from Figure 4 with bullying scores as the analysis variable, separated into groups of having student groups *and* not having student groups.



The p-value of this t-test is 0.1114 assuming unequal variances, which is higher than the standard confidence value of 0.05. Therefore, the alternative hypothesis must be rejected and the null hypothesis accepted. The presence of a formal student group does not have a significant effect on the bullying score as surveyed by the schools.

Business Question: Do MHPs Significantly Affect Bullying?

In a similar manner, if the school wants to examine the statistical significance of MHPs working in a school, then first, data must be selected where there are no student groups or parent groups. Again, the null hypothesis would be, *Employing a MHP does not have a significant statistical significance to bullying scores,* while the alternative hypothesis would be, *Employing a MHP does have a significant statistical significance to bullying scores*.

Figure 7

Data filtered to include only schools who responded that they have not instituted formal student groups OR parent groups.

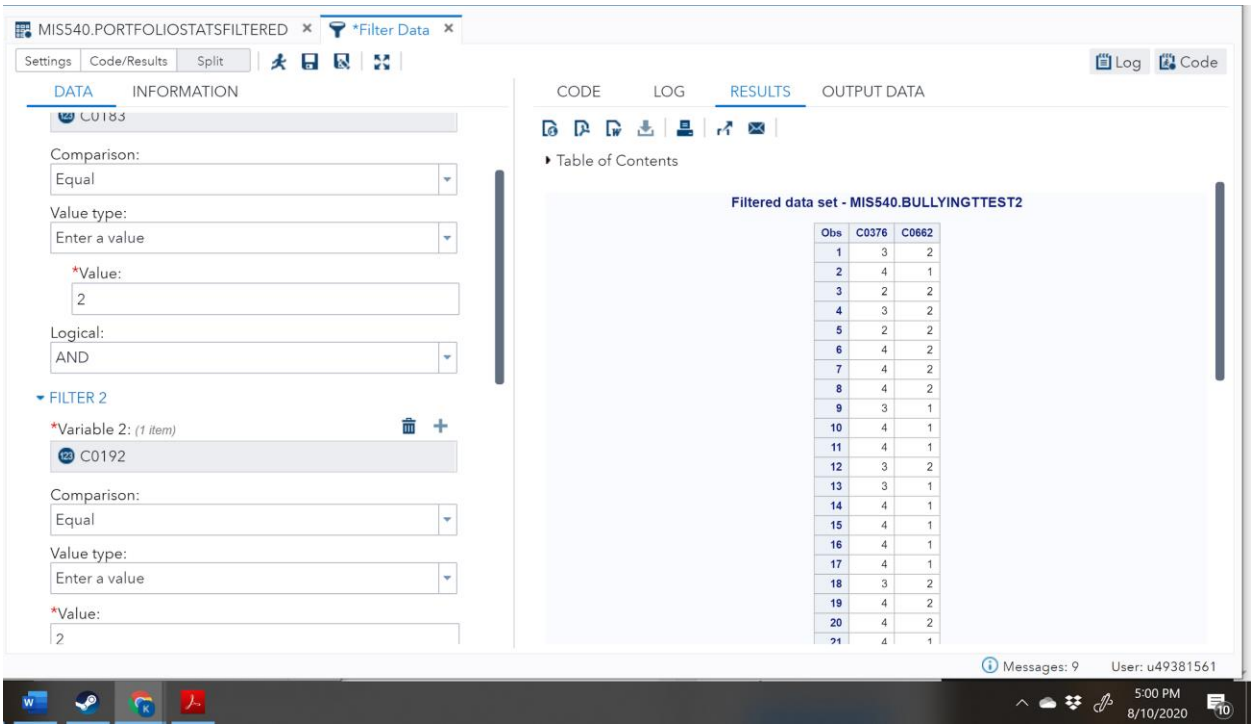
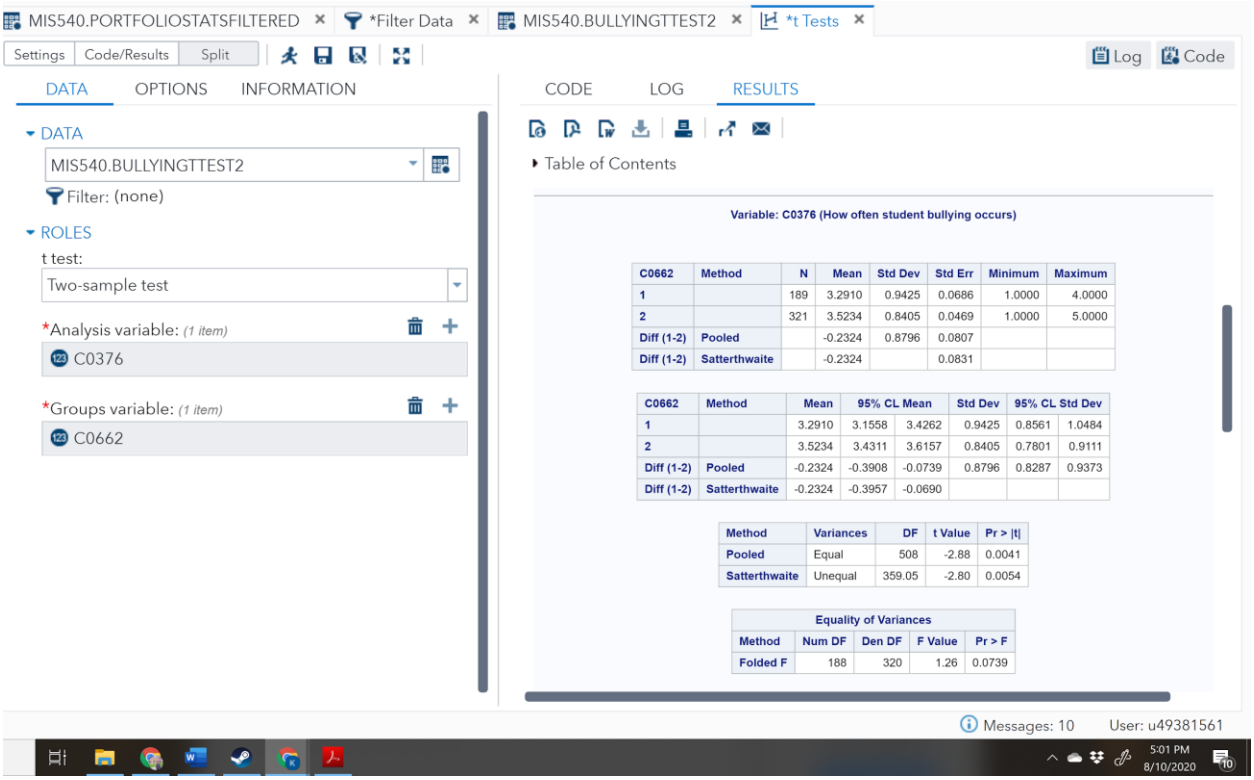


Figure 8

Two-sample t-test with bullying scores as the analysis variable, separated into groups of employs a MHP, *and* does not employ a MPH.



C0662	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
1		189	3.2910	0.9425	0.0686	1.0000	4.0000
2		321	3.5234	0.8405	0.0469	1.0000	5.0000
Diff (1-2)	Pooled		-0.2324	0.8796	0.0807		
Diff (1-2)	Satterthwaite		-0.2324		0.0831		

C0662	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
1		3.2910	3.1558	3.4262	0.9425	0.8561	1.0484
2		3.5234	3.4311	3.6157	0.8405	0.7801	0.9111
Diff (1-2)	Pooled	-0.2324	-0.3908	-0.0739	0.8796	0.8287	0.9373
Diff (1-2)	Satterthwaite	-0.2324	-0.3957	-0.0690			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	508	-2.88	0.0041
Satterthwaite	Unequal	359.05	-2.80	0.0054

Equality of Variances				
Method	Num DF	Den DF	F Value	Pr > F
Folded F	188	320	1.26	0.0739

A t-test performed on a sample that employs a MHP gives the p-value of 0.0054. This is greatly lower than the standard confidence value of 0.05, and therefore the null hypothesis can be rejected. Hiring a MHP is shown to not have statistically significant effect on the bullying score.

Hiring a MHP

The mean bullying score for Group 1 (MHP) is 3.3069, while the mean for Group 2 (no MHP) is 3.509. This is surprising, because this suggests that schools who employ MHPs as an alternative to student groups actually experience slightly more bullying than schools who do not, by a mean difference of 0.2020.

This could be because schools who record higher amounts of student violence and bullying find it necessary to resort to hiring a counselor. Common sense states that it is unlikely that employing a MHP would be the cause of a bullying increase. In fact, Buch's study showed

that 34% of students listed MHPs as their greatest need when it comes to addressing the issue of student violence (Buch, 2018, p. 20).

Additionally, there have been studies linking socioeconomic disadvantage to higher amounts of bullying (Tippet & Wolke, 2014). Schools with large amounts of students suffering from socioeconomic disadvantage tend to be public schools granted government funding; since this is the case, it is more likely that the government can expend the resources to hire a licensed mental health professional to work with students at that school. With the results of the t-test in mind, it is possible to hypothesize that the schools that employ MHPs would have higher levels of bullying without the presence of the hired professional.

Alternatively, studies have been done which suggest that the best recourse to preventing student bullying is peer counseling, as students are likely to trust their friends with such complex personal issues (Buch, 2012, p. 12).

However, the question can be asked regardless, *Do schools with the most student violence <u>all</u> employ MHPs?* However, by selecting all schools that listed a bullying score of 1, or, *happens every day*, a pie chart indicates that roughly half of those schools hire a MHP and half do not.

Figure 9

Filtering data to display only schools who gave a bullying score of 1.

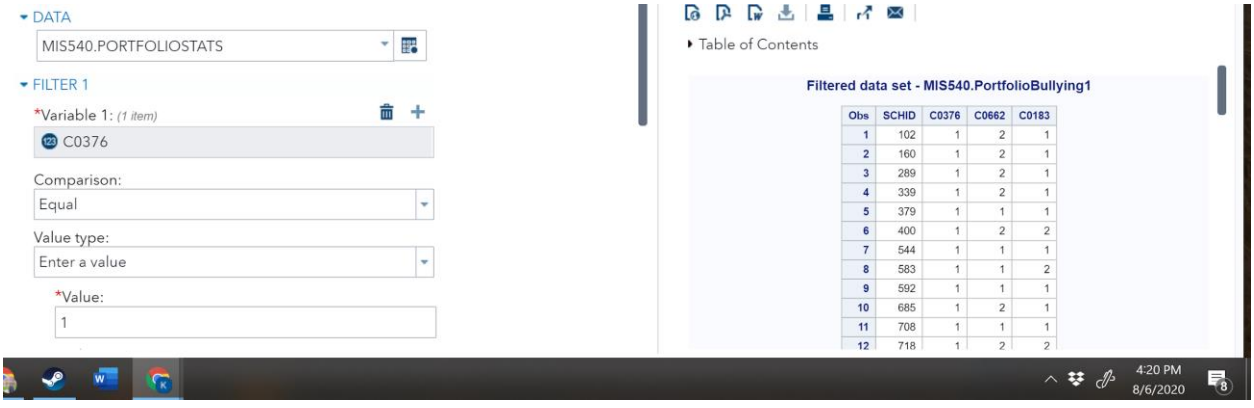
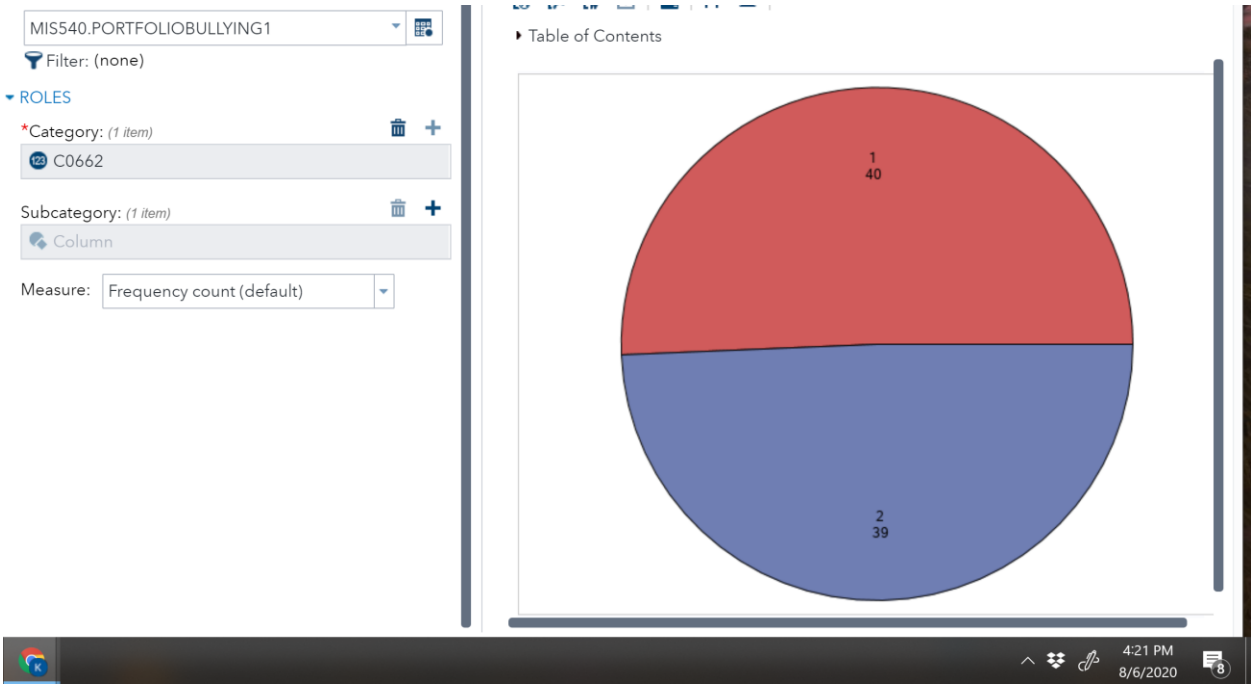


Figure 10

The pie chart shows that of those schools, it is nearly a perfect 50/50 split between schools who employ a MHP and schools who do not. 1 represents yes, 2 represents no.



Due to the fact that very little other information was included in this graph, it is likely that there are many other factors at work here. The school should do further investigation into the neighborhood in which the school is located, the socioeconomic status of the families, and many other factors that influence a child's upbringing.

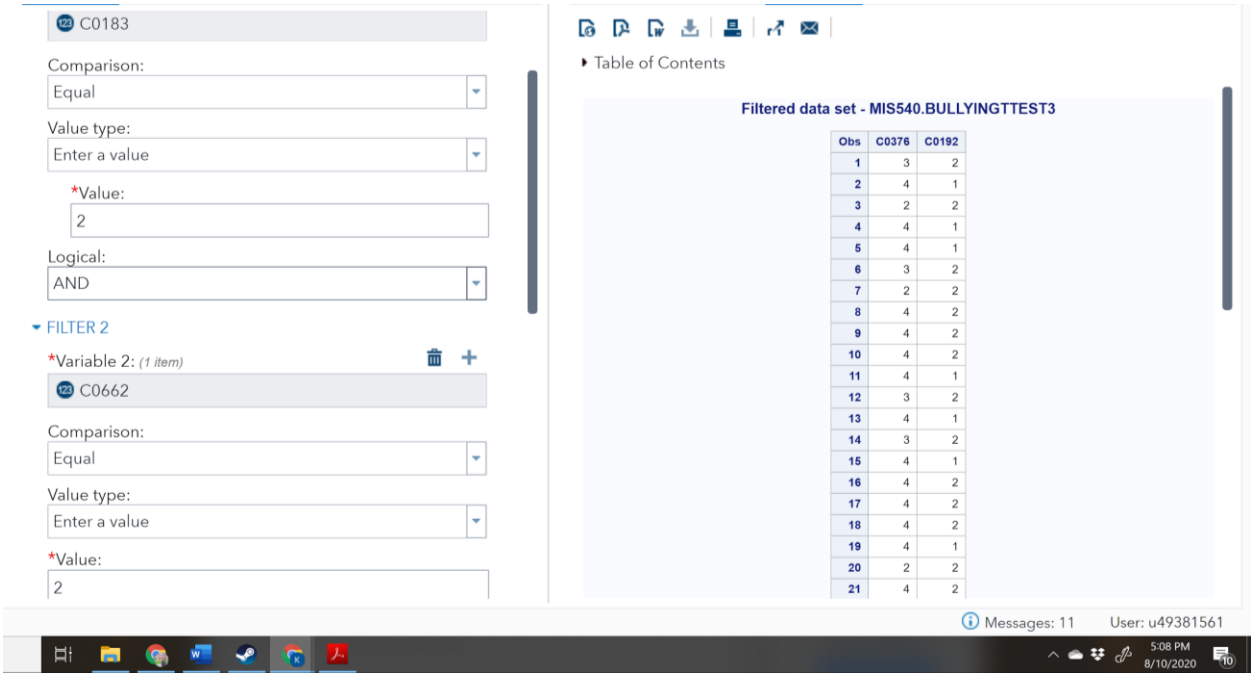
However, it is also possible that the solution does not entirely lie with the measures implemented by the school, but outside of the school and in the home, as even a MHP's employment is a reactive measure rather than a proactive measure. This is relevant to many discussions suggesting that home life and family influence is the primary indicator of whether not a student is likely to display bullying tendencies at school (Wong et. al, 2013, p. 287).

Business Question: Do Parent Groups Have a Significant Effect on Bullying?

In answer to this, a third t-test can be performed to discover whether implementing school-led parent groups has any significant effect on the bullying score. This must be done by first filtering data so that only schools who reported *Yes* for parent groups and *No* for student groups and MHPs are included.

Figure 11

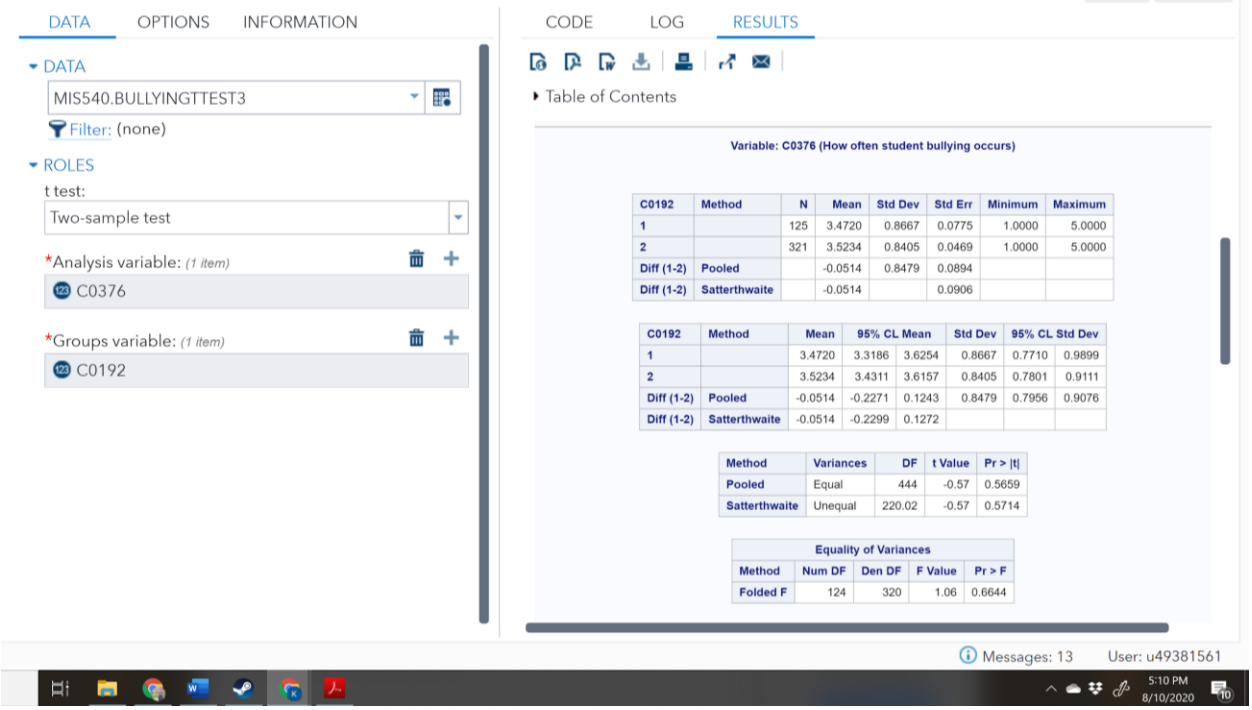
Data is filtered so that only schools with 1 for Variable C0192 and 2 for Variables C0662 and C0183 are included.



Using this dataset, a null hypothesis can be formed: *Having formal parent training (a C0192 value of 1) does not significantly affect the bullying score.* The alternative hypothesis is, *Having formal parent training groups does significantly impact the bullying score.*

Figure 12

Using the dataset from Figure 11, a t-test is performed.



Again, the t-test performed gives a p-value of 0.5714, assuming unequal variance. This is smaller than the previous p-values, but still greater than the generally accepted 95% confidence interval of 0.05. Therefore, the alternative hypothesis is rejected and the null hypothesis maintained. Bullying does not appear to be significantly affected by the use of parent training groups.

Does the Reporter Affect the Score?

All of these results may seem surprising, or even disappointing considering that bullying is such a prevalent and pressing issue. However, the last thing the school should take into consideration while analyzing the data is the fact that the bullying scores, or all values from variable C0376, are subjective.

According to the dataset provided by NCES (2018), data was collected by various school administrators, including principals, vice principals or disciplinarians, security, other school-level staff, or district superintendents/staff. Due to the varying levels of authority or student

contact, it is possible that they do not have a complete picture of the bullying that goes on in their institution.

Countless interventions are staged for teachers to learn how to recognize, acknowledge, and prevent bullying; teacher knowledge is a given when seeking factors that will deescalate aggression and bullying (Letendre, 2016, p. 237). However, this pressure comes from administration, whereas similar programs are often not attended by administrators themselves. This could potentially cause bias in recording subjective results from individual observations. Alternatively, the reason that the programs are mainly directed at teachers could be that teachers are the ones who need to benefit the most from training, while administrators have a clearer view of the underlying issue in the school.

In order to investigate the effect of the reporter on the bullying score, data will be separated into two groups. Group A will include observations sampled only from vice principals/disciplinarians (where variable C0014_R = 2), while Group B will include observations sampled from school-level staff (variable C0014_R = 4).

Figure 13

Sampling data only from variables SCHID, C0376 (bullying score), and C0014_R.

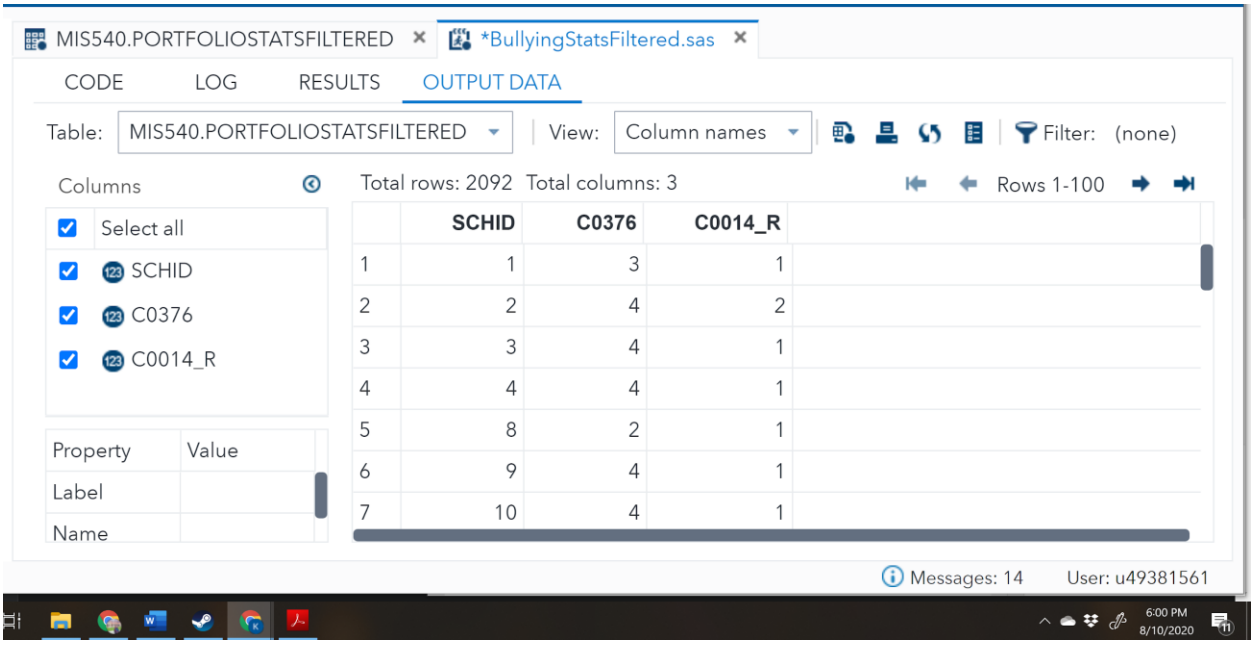


Figure 14

There are far more observations with C0014_R = 2, so first a table is created with all said values.

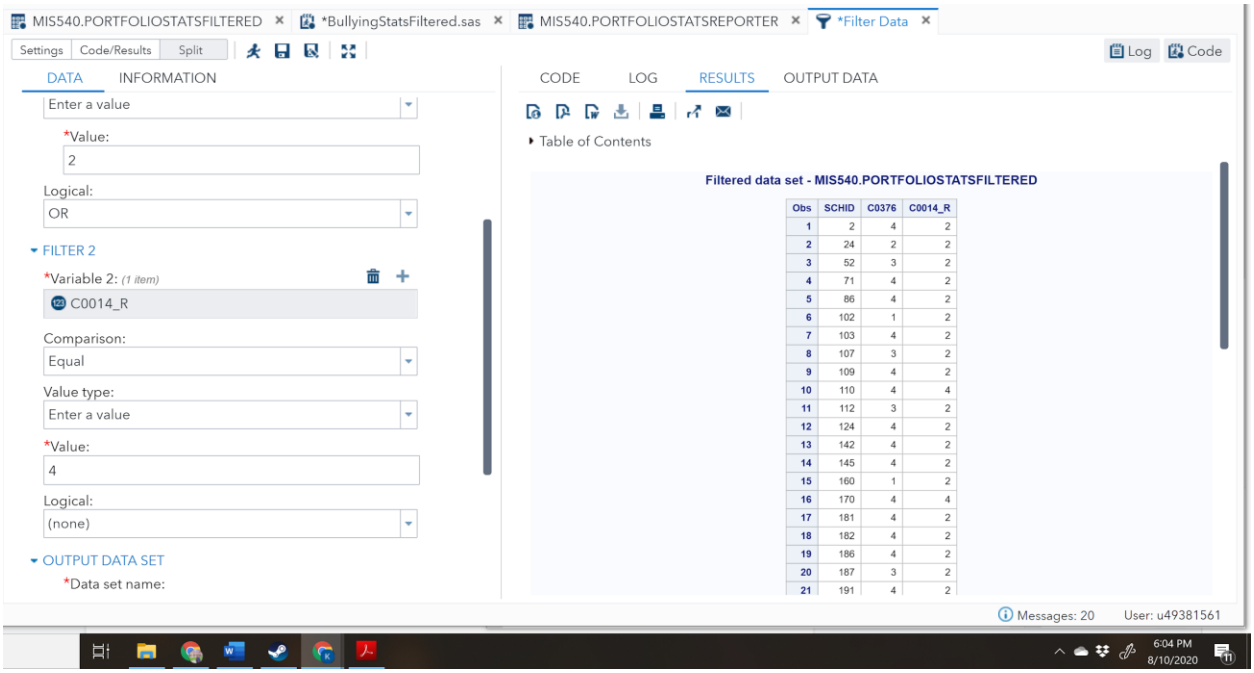


Figure 15

Next, a random sample with 72 observations is taken from this table with C0014_R = 2. This forms Group A.

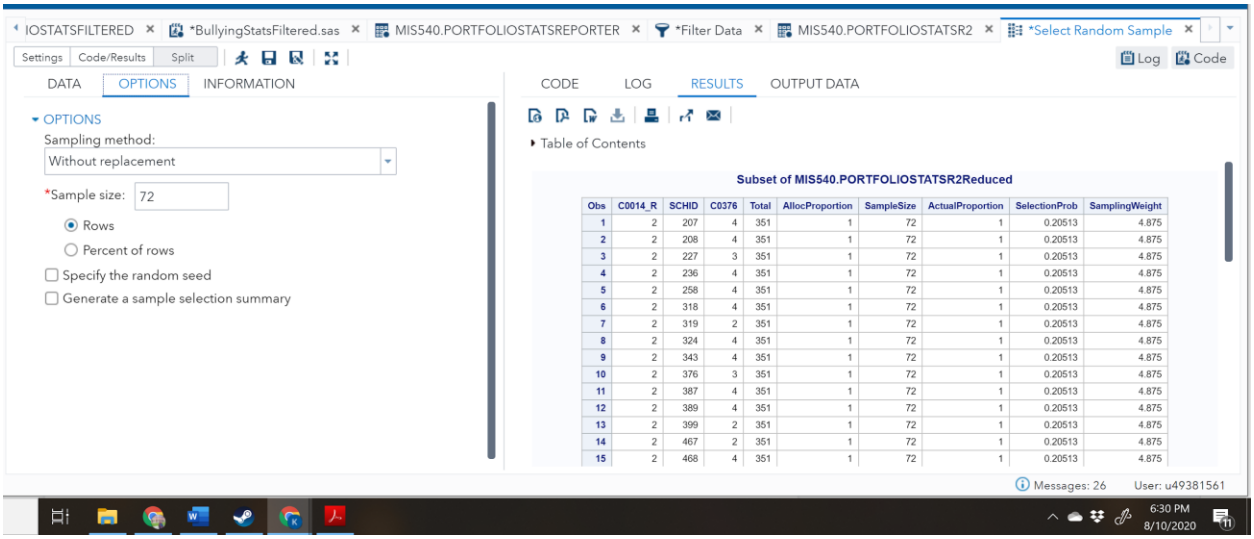


Figure 16

Then all values where C0014_R = 4 are put into a table of their own, for Group B.

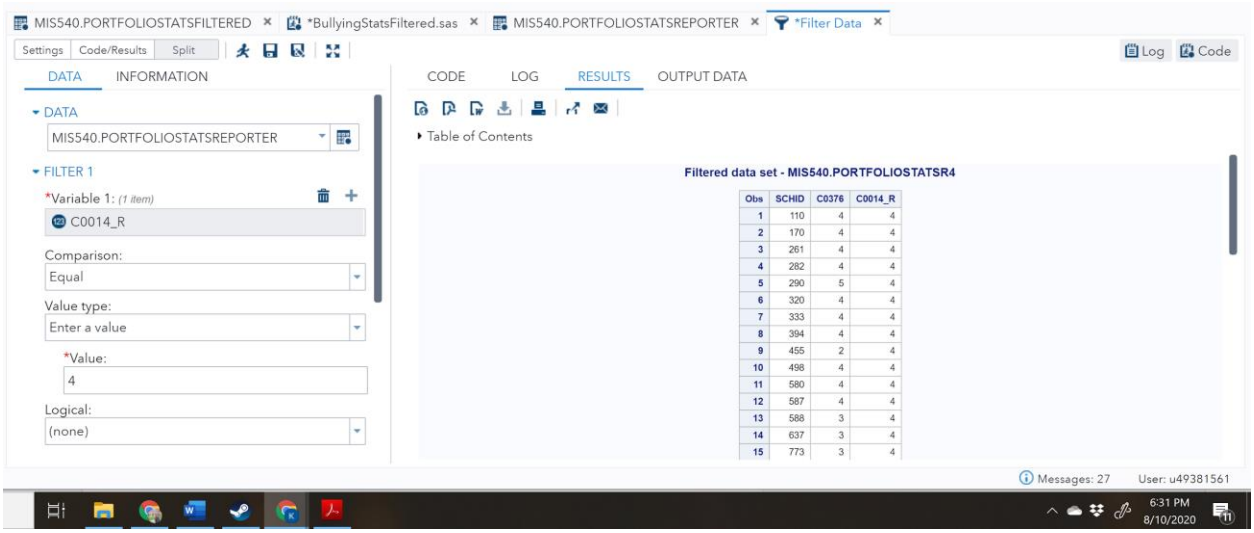
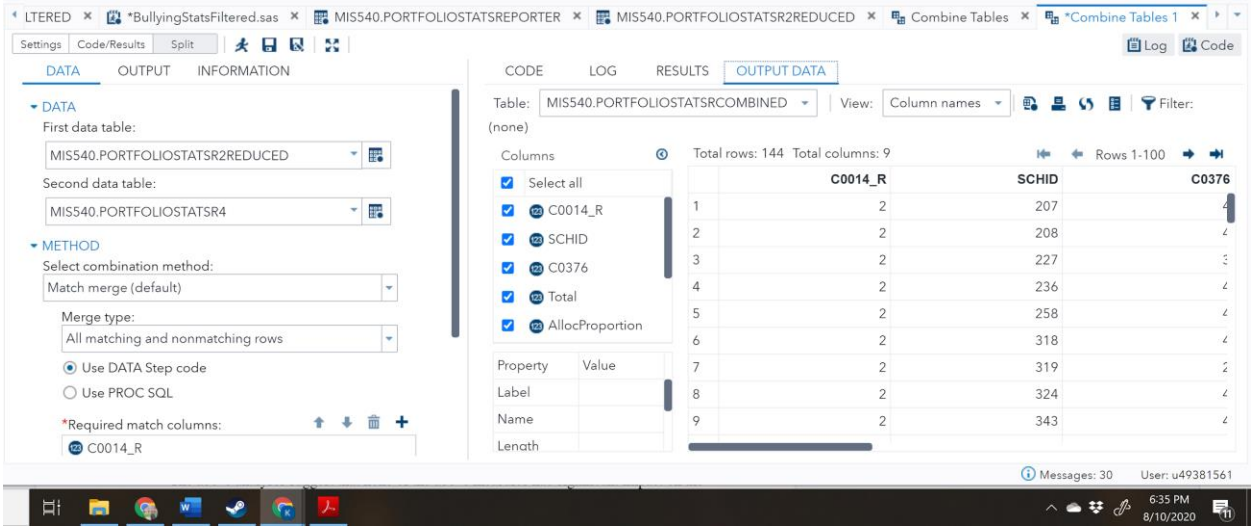


Figure 17

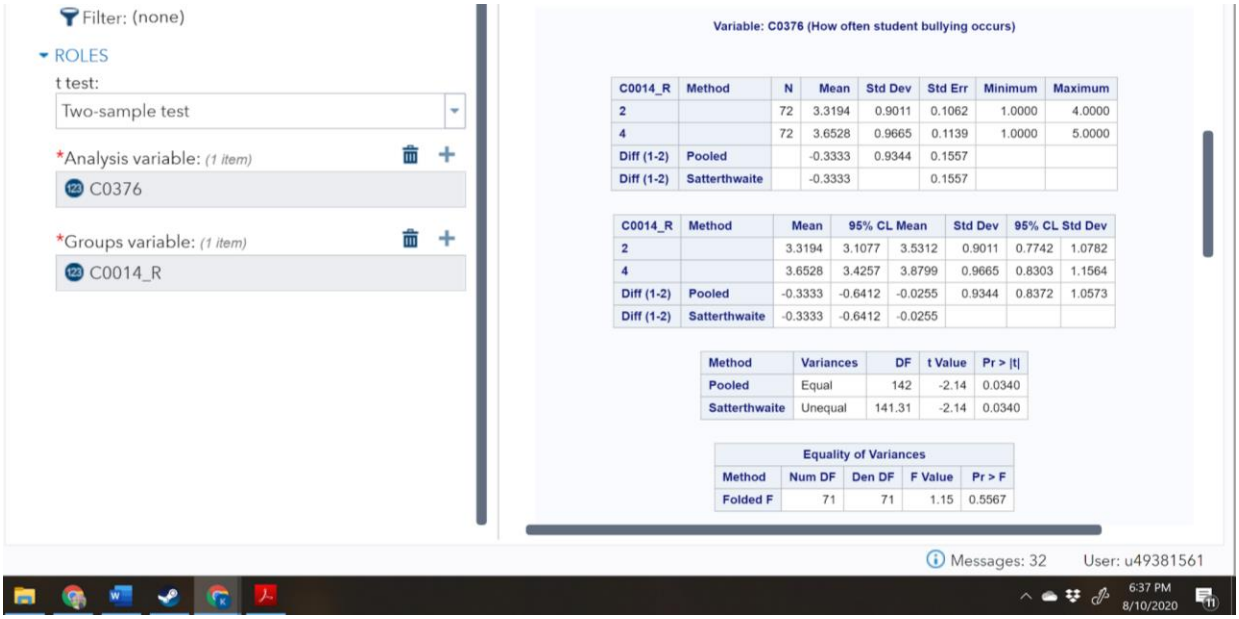
Finally, Group A and Group B are combined into one table.



With the table now prepared for t-testing, the null hypothesis will state that the adult reporting does not have a significant statistical effect on the bullying score, while the alternative hypothesis states that the adult reporting has statistical significance when it comes to the bullying score.

Figure 18

The t-test for reporters with relation to the bullying score.



This t-test shows that when assuming unequal variance, the p-value is 0.034, which is smaller than the accepted value of 0.05. Therefore, the null hypothesis can be discarded and the alternative hypothesis accepted. The reporter does, in fact, have statistical significance when it comes to the bullying score.

Administrators (C0014_R = 2) scored a mean of 3.3194, while school level staff (C0014_R = 4) scored a mean of 3.6528. This suggests that administrators report a higher level of bullying problems within their school than the school-level staff.

Conclusion & Business Insights

The above analyses suggest that if possible, the small school in question should hire a licensed mental health professional. Creating formal student groups to address social skills might provide relief and a safe place to some students, but it did not significantly affect the amount of bullying noted in the school. Neither did school-led parent groups aimed at reducing the amount of bullying at schools, and increasing awareness of troubling behaviors.

In the end, the school should do further research into both the attendance and the effectiveness of teaching parents and guardians how to address student behavioral issues. Due to the high level of influence parents/guardians have when raising their child in the home, it seems unlikely that parental involvement would be a negative influence. However, data was not collected on the type of parent who attended the meetings, and so it is possible that parents who could have benefited from the training did not attend. To further understand the data regarding parents attending meetings, it would be useful to collect data on which parents were unable to attend due to other responsibilities, like work; if it were significant that working parents had a correlation with students who displayed tendencies towards bullying or being a victim of bullying, then it would benefit schools to reevaluate the times that their programs were offered.

Additionally, it is possible that the program itself was ineffective for various reasons, and the school could do further research on why the other schools' programs were unsuccessful.

The same is true for the formal student groups, which also did not show promising statistical significance. More data would be useful in determining whether or not the student groups were voluntary or mandatory depending on behavior; if the student groups were voluntary, it is highly likely that few students who tend to bully others would not choose to attend the groups unless forced. If they did not attend, that would significantly impact the utility of formal student meetings.

It could also benefit the school to look outside this NCES dataset. Data was only collected nationwide; looking into other methods used internationally and researching the statistical significance of said methods could add insight.

Something to be considered is the fact that there are far more variables at hand which might or might not affect the bullying score recorded at each school. There are a lot of factors when it comes to analyzing human behavior, and the dataset used had a huge variety of responses recorded.

Finally, it must not be forgotten that the bullying score recorded was solely subjective, from varied administrative or teaching positions (NCES, 2018), and subjective data can be difficult to work with. Additionally, there were only 72 observations from school staff, in comparison to over 1500 principal observations and over 300 vice principal observations. Investigating the responses of the teachers who work daily with students in the classroom could be beneficial for understanding the phenomenon of bullying further, and implementing the proper preventative measures.

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